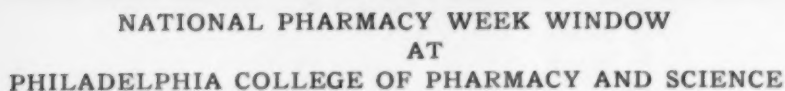


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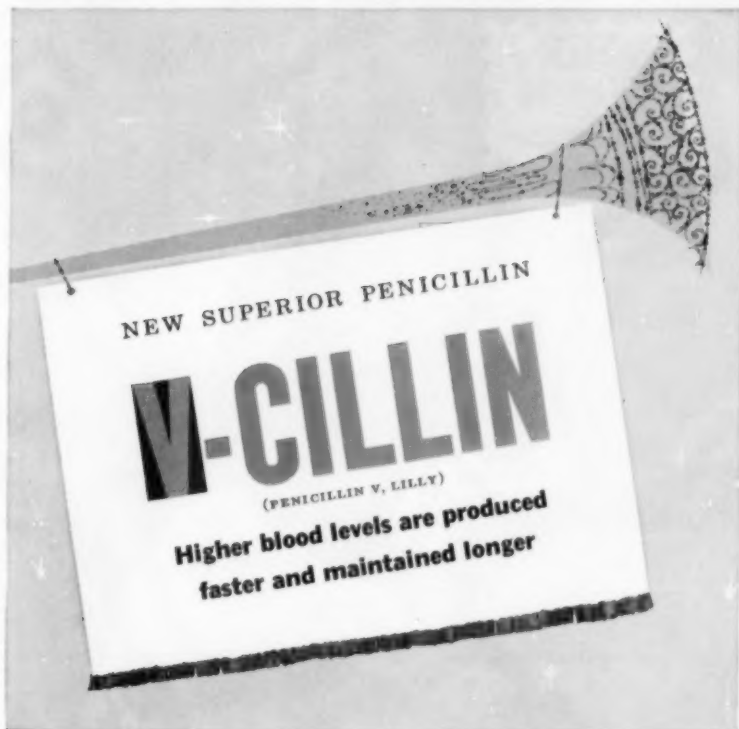
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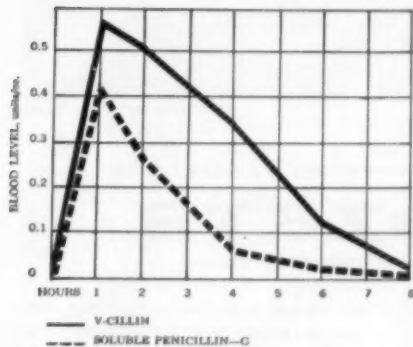
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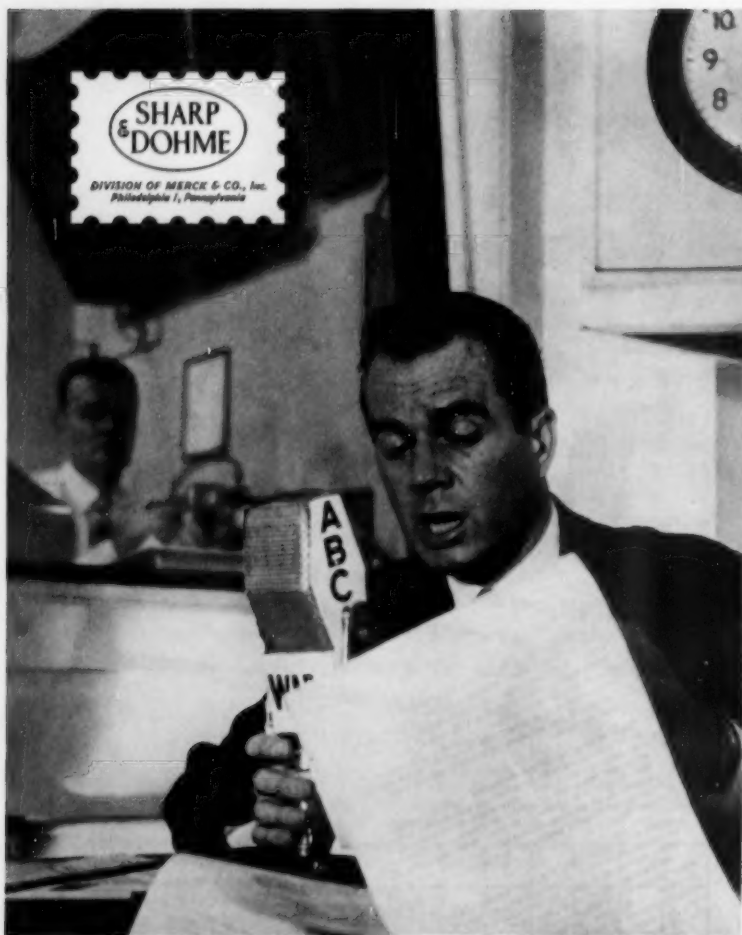
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E D I T O R I A L

WE'RE NOT ALL BAD

ONE of the factors most harmful to pharmacy's efforts to establish good public relations is the undue emphasis and publicity given to those few in pharmacy who are derelict in fulfilling their professional and legal responsibilities. Much of this originates in the hearings before Congressional Committees when officials of the Food and Drug Administration are seeking greater financial support for the operation of their department. It is indeed unfortunate that a function as important to the welfare of the people of the United States as that performed by the Food and Drug Administration must be ballyhooed with all sorts of lurid and criminal details in order to be convincing of its worth and need. Apparently, nothing is believed to weigh more heavily on the legislative mind than the fact that some pharmacist has sold a barbiturate or a central nervous stimulant over the counter, and the awful damage done by barbiturate intoxication and the excesses of those under central nervous stimulants are then portrayed in a sensational fashion until it seems to the listener that every drugstore is a seat of crime in the community rather than the fortress of health which it really is.

If these attempts by Food and Drug officials to gain greater financial support did not get beyond the halls of Congress, it would not be so bad, but they are picked up and emphasized by the press, much of which thrives and even survives on disaster and crime and the insatiable desire of Americans to read about it. Gradually, the American public has come to believe that many pharmacists are racketeers trafficking in narcotics and selling drugs which contribute largely to the delinquency of our juveniles.

Now, it is well-known that there are a few pharmacists guilty of such malpractice. Court records bear this out, but the fact that is completely overlooked is that much more of these dangerous drugs get into lay hands through channels other than pharmacy. As it happens, no efforts are made to establish this and those in other areas are not supervised or regulated as is the pharmacist. Their derelictions go unnoticed and ignored, while the few pharmacists who are

guilty are publicized to the point that the whole profession is stigmatized. Of course, it can be said that, if not a single pharmacist were guilty of such violations, our hands would be clean and we would not be exposed to such bad publicity. This indeed may be true, but is it not too much to expect all pharmacists to be professionally moral and legally without blemish when no other group of human beings is so blessed? We suspect that pharmacists by and large are just as well-behaved and have just as high a sense of integrity as any other group in the health professions. We happen to be extremely vulnerable to those who would use our weaknesses and our derelictions to further their own personal advancement and interests.

Some few persons in pharmacy have gone on record decrying this undue singling out of pharmacy as the source of all evil pertaining to drugs. Possibly, the time has come when pharmacists generally should, while they are condemning their delinquent brothers, also condemn those who make capital out of their delinquency and exploit it to the hilt. We have our sordid side—and who doesn't—but pharmacists should not consent to being pushed around as pawns in a game being played by government agencies and others who use us as a means to an end. We are not all bad and it is about time we insisted on the recognition of this fact.

L. F. TICE



THE CURRENT STATUS OF NARCOTIC DRUGS AND DRUG LEGISLATION *

By Harry J. Anslinger

THIS Committee has the distinction of being charged with the responsibility to make a thorough review of the illicit narcotics traffic and to recommend new laws that will strengthen our attack on the narcotics problem.

The findings of this Committee will be eagerly anticipated not only by all of us who are concerned with the administration and enforcement of the narcotic laws but by every citizen of the United States. I am confident that the investigation of this Committee will be conducted with the utmost thoroughness and competence, and that its findings will serve as an invaluable guidepost in the interpretation and simplification of our Federal narcotic laws.

Your Committee will be interested to know that the incidence of drug addiction in Canada closely approximates that in the United States and that a special committee of the Canadian Senate has been engaged for several months in making a study similar to the one you are conducting. I venture the suggestion that your Committee exchange records with the Canadian Senate Committee particularly because the narcotic traffic in both countries is similar and trafficking is interlocked because of smuggling into both countries from Europe and the Far East.

Drug Addiction

Drugs Used:

For many years morphine, heroin, smoking opium, and cocaine were the principal drugs used illicitly in the United States. In recent years marihuana smoking has become an increasing problem.

Since about 1950 it has been evident to narcotic agents and local police authorities that most addicts in the United States have preferred heroin. Traffickers can buy small quantities of pure heroin, and by adulterating it, make enormous profits from sales to eager addicts.

* Statement of Commissioner of Narcotics, Bureau of Narcotics, Treasury Department, Before the Senate Judiciary Sub-Committee on Narcotics, June 2, 1955.

Because of its addicting qualities, because its therapeutic value is no greater than that of morphine, and also because of its high toxicity, heroin may not be legally imported, manufactured, or sold in the United States. It has been outlawed in all but five countries.

Heroin is injected by needle. Marihuana is smoked in the form of cigarettes. There is some opium smoking among Chinese and some morphine is used by addicts who rob drug stores, and also forge doctors' prescriptions.

In recent years synthetic drugs have become an increasing problem in this as well as in other countries. Certain professional and sub-professional groups constitute those addicted to synthetic drugs, whereas people in the lower social levels have been the greatest offenders in addiction to natural narcotic drugs.

Extent:

Before the passage of national control legislation there was one addict in every 400 persons in the United States. By World War I this incidence had been reduced to about one in every 1,500 persons, and by World War II the incidence was found to be roughly one in 10,000 rejected for military service because of addiction. At this time the narcotic traffic in the United States was probably at the lowest ebb since the enactment of Federal legislation to control narcotics. Following World War II and the resumption of shipping there was an influx of heroin from the Middle East and European countries. Beginning in 1950, heroin from an uncontrolled source, Communist China, began to reach the United States in volume. This traffic still continues. Heroin smuggling from Lebanon is also a serious problem.

The total number of addicts in the United States today is estimated at between 50,000 and 60,000, or an incidence of about 1 in 3,000 of the population. An interim report on the survey of drug addiction begun by the Bureau of Narcotics in January 1953 shows 28,514 addicts counted to date. It is believed that this count, consolidated monthly from reports received from Federal, State, and local authorities throughout the United States, will approach the above estimate in 2 to 3 years.

Among the addicts reported in the survey, 77.83 percent used heroin, 9.81 percent used morphine, 1.47 percent used opium, 6.3 percent used synthetic drugs, and 4.52 percent and 0.07 percent were reported as using marihuana and cocaine respectively.

Males accounted for 79.01 percent of the total; age groups of both sexes were as follows:

<i>Years</i>	<i>Percent</i>
Under 21	13.1
21 to 30	50.3
31 to 40	19.4
Over 40	17.2

A further study of the group under 21 years of age revealed that 87.61 percent of this group were 18 years old or over.

Reports relating to the United States Public Health Service Hospital at Lexington show that the majority of persons addicted to opiates come from cities of one million or more population.

Addiction statistics maintained by the Bureau of Narcotics show the greatest concentration of addicts in the areas of New York City, Chicago, and Los Angeles, with these areas showing 7,937, 6,975, and 1,896, respectively for the 2-year period 1953-54. The strength of the Bureau of Narcotics is concentrated in these areas of the most illicit activity, and here is also found a pooling of equipment with other agencies and the police departments.

Drug addiction among adolescents took on major proportions after World War II, and reached its peak about 1951. Since then it has shown signs of abating except in several areas.

Drug addiction among youth is usually a part of the overall juvenile delinquency problem, although some adolescents try drugs for the thrill they hope to get out of them, and despite all warnings of the dire consequences of indulging in this deadly habit, they believe they can try them and then give them up, only to discover too late that their curiosity was the vehicle of their utter ruin. Youthful addicts, if given treatment during the early stages of their addiction, represent the most hopeful cases for complete cure of the drug habit.

Treatment:

The length of time required to bring about drug addiction may be only a few weeks, if the drug is taken regularly and frequently. It is usually first taken in small quantities and at infrequent intervals, but as the craving begins to become insatiable the quantity and frequency must be increased so that the addict will experience the feeling of euphoria which he felt in the early stages of his addiction because

by this time his body has built up a tolerance to the drug. This may mean that he will now take a number of capsules, for intravenous injections, daily.

The physical effects of drug addiction are plainly visible in most addicts, because with continued addiction the victim is likely to neglect to eat enough nutritious food, for he no longer cares about anything except keeping himself supplied with drugs. Abstinence from the use of drugs, either during the course of treatment in a Federal narcotic hospital or while serving a prison sentence, ordinarily restores the addict to normal physical health, even though his psychological dependence on the drug may not have been changed. If he returns to using drugs, his physical condition again will undoubtedly deteriorate, together with his moral structure.

The maintenance of addiction is so expensive that most addicts cannot possibly maintain their supply of drugs without resort to vice. When his daily intake is comparatively small the addict may cover up his diversion of cash on hand for this purpose, but when the evil has completely mastered its victim, he must have large amounts of money, because he is required to pay cash before the peddler will let him have the drug he craves. From shoplifting and petty thievery, the addict quickly graduates to major crimes.

Many addicts have a history of social maladjustment, and are likely to be well schooled in crime before they turn to drug addiction. Many of them have been the victims of parental neglect and broken homes.

Drug addiction could not exist without the availability of drugs. Neither could it exist without the desire of the individual for these drugs.

A workable solution of the drug problem involves close coordination of the most strenuous efforts of narcotic enforcement agencies and medical authorities. Penal institutions make us safe from criminal drug addicts and drug peddlers by keeping these undesirable people off the streets and out of further criminal activity. The Federal hospitals, and State and private institutions specially equipped to treat drug addiction can withdraw physical dependence on drugs, and by extensive psychological reconditioning, help addicts make the adjustment necessary to resume their normal place in life. Many addicts lack the moral stamina to abstain from using drugs after they are apparently cured. Some return several times for the same course of treatment. Medical authorities in charge of these rehabilitation

programs believe that even though an addict relapses several times, there is some hope that he may eventually respond to treatment and never return to the use of drugs. Regular medical examinations and conferences at regular intervals following addiction withdrawal treatment are likely to be helpful in preventing recidivism.

Rehabilitation facilities are available and are being used at the United States Public Health Service Hospitals in Lexington and Fort Worth, as well as State and private institutions. Riverside Hospital, North Brothers Island, New York City, rehabilitates youthful drug addicts in the State of New York.

Some progress has also been made in rehabilitation in Chicago and Detroit. After-care is probably one of the most promising phases of rehabilitation.

The American Medical Association, the National Research Council, the United Nations Commission on Narcotic Drugs, and other authorities on the subject of addiction have stated that drug addiction cannot be cured by ambulatory means.

Legislation

The first regulatory Federal narcotic measure enacted in the United States was the Act of February 9, 1909, which prohibited the importation and use of opium for other than medicinal purposes. This was followed December 17, 1914, by the Harrison Narcotic Law, which was a taxing measure designed to have the effect of regulating particularly the domestic trade and distribution of narcotic drugs.

The Act of February 9, 1909, was consolidated and amplified and given the title of the Narcotic Drugs Import and Export Act on May 26, 1922. It was further amended June 7, 1924, to limit generally the importation and exportation of narcotic drugs, to prohibit the importation of opium for the manufacture of heroin, and, as a practicable measure, to outlaw heroin in the United States.

Although the Harrison Narcotic Law was enacted in the form of a revenue measure, it also served to give effect to obligations incurred under the 1912 International Opium Convention. The Opium Poppy Control Act of December 11, 1942, was also based on treaty obligations and as a practicable measure prohibited the growing of the opium poppy in the United States, since in no case has a license been issued for this purpose.

The Marihuana Tax Act of August 2, 1937, limited the use of marihuana to legitimate medical needs. This in effect prohibited the

use of marihuana because it has since been removed from the United States Pharmacopoeia, as it serves no useful medical purpose.

Public Law 255, 82d Congress, 1st Session, known as the Boggs Act, amended the penalty provisions of the Harrison Narcotic Law, the Narcotic Drugs Import and Export Act, and the Marihuana Tax Act to provide minimum penalties of two, five, and ten years for first, second, and third time offenders, respectively. Upon conviction for a second or subsequent offense, the imposition or execution of sentence shall not be suspended and probation shall not be granted.

By a recent amendment to the Internal Revenue Narcotic laws (Public Law 729, 83d Congress, approved August 31, 1954) authority was granted whereby registered retail dealers (druggists), subject to stated conditions, might fill oral prescriptions for certain narcotic drugs and compounds of narcotic drugs which were found and by regulation designated to possess relatively little or no addiction liability.

Control of Legitimate Trade

The Bureau of Narcotics issues permits to import crude narcotic drugs and to export drugs and preparations manufactured therefrom under the laws and regulations, and determines the quantities of narcotic drugs to be manufactured in the United States for medical purposes. It exercises control over the legitimate production and distribution of narcotic drugs through the approximately 200,000 registrants; namely, manufacturers, wholesalers, physicians, and pharmacists.

A limit is imposed on the amount of drugs manufactured in order to comply with the requirements regarding estimates of the 1931 Convention for the Limitation of the Manufacture of Narcotic Drugs. Also in compliance with this convention, manufacturers are required to make quarterly returns of raw materials and drugs received into the factory, of drugs produced, of raw materials and products disposed of, and of the quantities remaining in stock. Wholesalers are required to make monthly returns of all transactions. Physicians and retail pharmacists are required to keep detailed records of drug transactions and to make them available to persons authorized to inspect them.

Federal Enforcement

The enforcement of the above laws and amendments thereto and all other Federal narcotic laws has from the beginning been the re-

sponsibility of the Treasury Department, and the laws relating to the enforcement and administration of the internal distribution of narcotic drugs and marihuana have been held constitutional because they are taxing measures.

The Act of June 14, 1930, created in the Treasury Department a bureau known as the Bureau of Narcotics, which is charged with the investigation, detection, and prevention of violations of the Federal narcotic and marihuana laws and of the Opium Poppy Control Act mentioned above. In addition, the Bureau of Narcotics supervises the administration of those sections of the Internal Revenue Code relating to narcotic drugs and marihuana, the Opium Poppy Control Act, and related statutes including the permissive features of the Narcotic Drugs Import and Export Act.

In addition to working closely with the Bureau of Customs, which has sole responsibility to prevent smuggling, the Bureau of Narcotics concentrates its efforts on interstate violators and on large wholesale traffickers, both interstate and intrastate, as the most effective utilization of limited manpower in the fight against the vicious underworld traffic in narcotics. There is also extensive liaison and cooperation with State and local authorities in eliminating the small retail peddlers of narcotics.

Through cooperation with foreign governments, the Bureau of Narcotics has assigned agents to work with enforcement authorities of those governments to develop evidence against international narcotic traffickers, to eliminate the source of supply of the contraband at the point of origin or transit before the narcotics reach the United States. The Bureau has found that engaging the international traffickers first hand at the source more than warrants the small number of agents that can be made available for this important duty. Our main task abroad is to destroy clandestine laboratories for the manufacture of heroin destined for the United States.

Over a 25-year period the enforcement of Federal narcotic laws has been accomplished with an average force of 227 agents and an average budget of \$1,623,892. This limited force, using every available facility, has had to curtail investigations because of lack of funds to purchase evidence and extend undercover operations into the intricate facets of the traffic, both in the United States and foreign countries of source and transit to the United States.

Although Congress has authorized 275 agents for the Bureau of Narcotics, the present budget of \$2,770,000 limits the number of

agents to 250, which is a field force about the size of the average police force of a city of 200,000 to 300,000 population. These agents average 57 hours of work per week, and are responsible for about 3,000 convictions annually, which is approximately 300 percent greater production than most other enforcement agencies.

The scope of productive investigations by the Bureau of Narcotics is emphasized by the fact that for an 8-year period, 1947-54, an average of 11.8 percent of the total Federal prison population in the United States were persons convicted of violations of the Federal narcotic and marihuana laws, whereas Federal narcotic agents account for a very small percentage of Federal enforcement officials. This average progressed from 9 percent in 1947 to 15.7 percent in 1954.

COMPARATIVE SEIZURES OF NARCOTICS

<i>Name of drug</i>	<i>Average seizures for 1930, 1931, and 1932</i>	<i>Average seizures for 1951, 1952, and 1953</i>
	<i>Ounces</i>	<i>Ounces</i>
Raw opium	24,613	1,691
Smoking opium	8,090	1,908
Morphine	13,030	59
Heroin	5,829	1,867
Cocaine	346	45

These figures not only illustrate the reduced availability of the drugs in the illicit traffic through the enforcement work of the Bureau of Narcotics in the United States and abroad in cooperation with authorities of other governments, but also accentuate the changed picture of enforcement in that heroin has supplanted both opium and morphine as the principal drug in the illicit traffic. Although this change is also reflected in other countries, it is particularly true in the United States where heroin, a compact, easily concealed, high-tension, dangerous narcotic preferred by addicts, commands a dollar value far in excess of gold, which has made the investigations of the Bureau of Narcotics leading to the sources of supply not only more complex and extended but also much more costly.

New York City is the center of much of the illicit traffic in heroin, as it is smuggled through the port despite the constant vigi-

lance of Customs officers. Most of the heroin is cut to a small fraction of its original purity, and large quantities of it in highly adulterated form reach inland cities, where they are sold by local peddlers directly to addicts, at exorbitant prices.

During 1954 the principal sources of raw opium were Mexico, India, Pakistan, and Iran, and the total quantity seized throughout the United States was 781 ounces, compared with 690 ounces seized in 1953. The principal sources of prepared opium were Mexico, Kuwait, and Hong Kong, and the total quantity seized was 3,385 ounces, compared with 1,805 ounces seized in 1953. The principal sources of heroin were Communist China, Lebanon, France, Singapore, Thailand, and Mexico, and the total quantity seized was 1,787 ounces, compared with 2,360 ounces seized in 1953.

State Enforcement

State and local enforcement officers have been extremely co-operative in assisting the Federal officers in the task of investigating and bringing to justice dealers in illicit narcotics. The experiences of many of these local and State officers should prove valuable to your committee in studying the situation throughout the country.

At present all except five States have a Uniform Narcotic Law and all except three States have adequate narcotic legislation for effective enforcement. The number of State enforcement personnel is as follows:

<i>State</i>	<i>Number</i>
California	35
Connecticut	2
Florida	6
Kentucky	5
Michigan	1
New Jersey	6
New York	6
North Carolina	2
Oklahoma	2
Pennsylvania	13
Rhode Island	2
Tennessee	1
Texas	4

Local Enforcement

About 1950, the municipal police entered the field of narcotic work, and soon these local police were obtaining evidence to substantiate charges of illegal sale and possession of drugs, leaving the Bureau of Narcotics free to devote its time exclusively to the major problem of the wholesale trafficker.

In this stupendous task of bringing to justice the extremely cunning drug addicts and peddlers (many of whom are also addicts), local narcotic squads, working as part of their regular police departments, are doing a great deal of commendable work in tracking down illicit narcotic violators.

There are 24 cities throughout the United States in which the police maintain a Narcotic Division or Narcotic Squad. Foremost among these are: New York City with 200; Chicago with 94; and Los Angeles with 77.

There are 35 other cities with one or two police officers assigned to narcotic enforcement activities, bringing the total non-Federal narcotic enforcement personnel in the United States to 610.

The combined force of Federal, State, and local authorities accounted for 23,365 narcotic arrests in 1954. Some 60 percent of these arrests were in five cities, as follows: California 7,407; Illinois 2,046; New York 4,696; Michigan 1,924; and Texas 1,414. The concentration of narcotic traffickers in larger urban areas was pointed up by the fact that 89.9 percent of the total narcotic arrests reported were in 44 representative cities located throughout the United States.

Penalties

A severe blow has been dealt to the illicit drug traffic by the imposition of heavier penalties in the form of large fines and long prison sentences for drug peddlers and smugglers. In many parts of the country the Federal and State courts are now imposing these heavier penalties. Wherever this has been done consistently the drug traffic has noticeably decreased, as in New Jersey, Florida, Maryland, Virginia, the Northwest, and other States.

International Cooperation

Another effective means of controlling this traffic is in effect in New Jersey, where a recent law designates a drug addict as a disorderly person, punishable by a fine of \$1,000 or 1 year in prison, or

both. This law might well be adopted by all States. Compulsory commitment of drug addicts to an institution for adequate treatment should be carried out by all States and communities.

International narcotic controls have been accomplished over a 42-year period of trial and error. The first Assembly of the United Nations created the Commission on Narcotic Drugs. It is engaged in a great humanitarian effort to suppress the abuse of dangerous drugs and thereby reduce human misery. Its predecessor, the Opium Advisory Committee, was the only League of Nations organization which continued to function throughout the world during hostilities. The Narcotic Commission acts by making use, on the one hand, of the effective means made available by the several narcotic conventions and, on the other hand, of public opinion. The United Nations Narcotic Protocols are among the most important technical achievements standing to the credit of the United Nations.

Three other international bodies are engaged in this work. The trade in narcotics is watched over by the Permanent Central Opium Board, which meets semiannually in Geneva. Another international organ, the Supervisory Body, meets semiannually to review the estimates of all governments for medical needs. Nations have surrendered sovereign rights in this field to the extent that if they fail to furnish such estimates they will be bound by the estimates set up by the Supervisory Body. The Committee on Drug Addiction of the World Health Organization sits annually to review the field of newly discovered drugs to determine which shall be placed under international control.

The concerted international program in the field of narcotic drugs is directed toward the following objectives:

- (a) Improving the national and international legislation and administrative machinery in the field of narcotics;
- (b) Regulating national and international trade in narcotics;
- (c) Coordinating the efforts for treatment and eradication of drug addiction.

The basic instruments for attaining the above-mentioned objectives are six international treaties transferred from the League of Nations and three concluded under the auspices of the United Nations. A consolidated and improved convention is being prepared to replace all the instruments at present in force.

International control cut the manufacture of narcotic drugs almost in half. It reduced the world legitimate consumption of heroin from 2,650 kilograms to 266 kilograms. The 1948 Protocol giving international control to the new dangerous synthetic drugs throughout the world saved the United States from a flood of these dangerous drugs from European factories. When the 1953 Protocol for worldwide limitation of opium production comes into force, the tremendous overproduction of opium and the narcotics derived from it abroad—which feeds our illicit smuggling traffic—should be curtailed.

Conclusion

Despite the substantial progress which has been made in the field of narcotic drug control, there is abundant evidence that drug addiction remains a serious problem. Strong laws, good enforcement, stiff sentences, and a compulsory hospitalization program are the necessary foundations upon which any successful program must be predicated. These will go a long way toward suppressing the abuse of narcotic drugs. The greatest reason for an increase in drug addiction has been the failure on the part of the legislators and other officials to observe these important fundamentals.

ADAM SEYBERT (1773-1825)*

By Grady Roney and J. Hampton Hoch**

ADAM SEYBERT was one of the small group of Americans who diligently labored, at the beginning of the 19th century, to forward the sciences, particularly chemistry and mineralogy. He likewise was among the pioneers in manufacturing medicinal chemicals for domestic use. His life was dedicated to science and his country; but his accomplishments were too soon forgotten.

The Philadelphia shopkeeper, Sebastian Seybert, already had a son and daughter by his first wife when he married Barbara, the widow Brant, who had two daughters. The son born to this couple on May 16, 1773, was named Adam; thus Adam had three half sisters and a half brother. His father died when the boy was nearly four years old and his mother continued shopkeeping on North Second Street¹ for about 20 years, up to within a few years of her death which occurred in 1799.

We do not know where young Adam took his schooling. He may have secured his early education in the classics privately. Presumably he attended the College of Philadelphia during his teens, but he refers to studies under Rev. J. H. C. Helmuth "at the University," and prior to 1791 this could only have meant the University of the State of Pennsylvania. His preceptor in the study of medicine was Dr. Caspar Wistar who was Professor of Chemistry and the Institutes of Medicine in the Medical Department at the College of Philadelphia during its re-establishment from 1789-91 and worked hard to bring Philadelphia's two medical faculties together in the new University of Pennsylvania in 1791.

It is most likely that Adam Seybert served his apprenticeship with Dr. Wistar in the period 1787-91. He entered the medical department of the University of Pennsylvania in 1791 and studied²

* Read before the Section on Historical Pharmacy, A. Ph. A. Miami, Fla., May 6, 1955.

** School of Pharmacy, Medical College of South Carolina.

1. City directories from 1794 to 1797 also list the widow Seybert at 26 North Ninth Street, where she had a boarding house.

2. Chemistry under James Hutchinson; materia medica under Hutchinson and S. P. Griffiths; natural history and botany under B. S. Barton; anatomy, surgery and midwifery under Wm. Shippen and C. Wistar; theory and practice of medicine under Adam Kuhn; institutes (physiology) and clinical medicine under B. Rush.

under a distinguished group of teachers. As was customary he completed the courses for his medical degree within two years and graduated M. D. in 1793 (May 8th).

The thesis he presented was entitled "The Attempt to Disprove the Doctrine of the Putrefaction of the Blood of Living Animals." This effort is worthy of some remarks. It was printed, as required at the time of Seybert's candidacy for the doctorate in medicine, by T. Dobson³ and subsequently was included in the first volume of medical theses selected by Dr. Charles Caldwell for publication, in 1805.⁴

Dr. Boerhaave of Leyden and his disciples had taught that in many diseases the blood became putrid. This concept had diffused far and wide, but not without students here and there rejecting the idea. Adam Seybert was one of this minority group. In the introduction to his thesis he remarks, "I found that it [the notion of putrefaction of blood] had never been put to the test of fair experiment, but that speculative reasoning and a few indecisive facts were the chief support of the arguments on both sides . . . I now determined to contribute my mite toward investigating the matter by experiment."⁵ Then there follows a presentation of his observations on dogs which he examined post mortem, through which he confirms his ideas. This study, carried out in the summer of 1792 with the assistance of his friends Jesse Thomson, John Andrews and Jacob Wagner, Jr., exhibits in his choice of subject an independence of mind, and in the presentation of the experimental proof a "strength and clearness to think with good effect."⁶

This initial publication of Adam Seybert was dedicated to Rev. J. H. C. Helmuth, D. D.,⁷ "Professor of the German Language in the University of Pennsylvania etc., etc., etc. . . . as a small tribute of gratitude for his care and attention, in directing and superintending my studies, whilst under his tuition, at the University . . ." and in further dedication to Dr. Wistar, Seybert expressed indebtedness "for his very beneficial instructions . . . to him who planted

3. 78 octavo pages, at the Stone House Press, 41 South Second Street, Philadelphia.

4. A German translation was published in 1816.

5. Adam Seybert—"The Attempt to Disprove the Doctrine of the Putrefaction of the Blood of Living Animals," Philadelphia, 1793.

6. Charles Caldwell's "Autobiography," 1855, edited by H. A. Warner.

7. This prominent Lutheran clergyman was pastor of one of the largest churches in the city, Zion Church, and was a leader among the Germans of his faith.

the Seed of Knowledge, and with anxious solicitude, superintended the growth." He was grateful to Dr. Wistar for the progress he had made in Medical Science and signs himself "Your obliged friend and Pupil."

Shortly after graduation Dr. Seybert took a trip to Europe for further study and remained abroad for several years. In the summer of 1793 he was in London and thus missed the calamity of the yellow fever outbreak in his native city which raged from August to November. Dr. Benjamin Rush who gained considerable fame for his bleeding and purging regimen in this epidemic was supported in this practice by a minority of his confreres, Drs. James Woodhouse and John R. Coxe among them.

These two young men, James Woodhouse (1770-1809) and John Redman Coxe (1773-1864), proteges of Dr. Benjamin Rush, later became professors of chemistry at the University of Pennsylvania. Woodhouse was elected to the chair in 1795 over a more fully qualified competitor, Adam Seybert; then, at Woodhouse's death in 1809, Coxe was selected for the vacancy, and once again Seybert was an unsuccessful candidate. These three physicians,⁸ Woodhouse, Coxe, and Seybert often came into close association during the late 90's and first decade of the 19th century.

Dr. Rush got "great support and assistance" in the 1793 yellow fever epidemic from Dr. Wistar who even took the great purge himself on Rush's advice. After Wistar mended he "deserted", according to Rush who decided that Wistar headed a conspiracy against him. An estrangement and even hostility developed on Rush's part and was reflected in various directions. When Dr. James Hutchinson succumbed to yellow fever (and Rush's copious bleedings) in the 1793 epidemic, the chair of chemistry at the University of Pennsylvania became vacant. Dr. John Carson was elected to fill it (Jan. 1794) but died before delivering a lecture. Dr. Rush desired to have Joseph Priestley in this position; and he was elected to it (Nov. 1794) but declined. This left Drs. B. S. Barton and A. Seybert as candidates; both were supported by Caspar Wistar and other opponents of Rush. Finally Seybert was set aside, probably because he was

8. Woodhouse and Coxe were M.D.'s 1792 at University of Pennsylvania along with James Mease (1771-1846); Edward Cutbush (1772-1843) M.D. 1794 and Charles Marshall, Jr. (1774-1837) were contemporary Philadelphians who also contributed to the development of pharmacy in the early 19th century.

absent in Europe, for Barton as the Wistar candidate. Benjamin Rush originally hoped that his protege J. R. Coxe would come to succeed the aging Priestley in teaching chemistry at the University of Pennsylvania, after an 8 or 9 year tenure by Priestley, and advised Coxe to go to Edinburgh to prepare himself for this position; but Priestley's rejection of the chair left Rush without his favored candidate on the scene. So he determined to support James Woodhouse against Benjamin S. Barton.

The personal antagonism between Wistar and Rush was openly displayed in this battle for the chair of chemistry. The superior training which Seybert had achieved by this time (July 1795) was completely forgotten and Rush's influence succeeded in having Woodhouse elected.⁹

While in London in 1793 Adam Seybert attended Dr. Lowder's lectures on midwifery.¹⁰ He moved on to Edinburgh in 1794, then travelled to France despite the revolution which was then on and "spent some time at the Ecole des Mines in Paris" studying mineralogy "under the Abbé Haüy, the 'father of crystallography'." Moving on to Germany in 1795 he studied at Göttingen where Benjamin S. Barton had taken his medical degree in 1789 and where the renowned J. F. Blumenbach was teaching mineralogy and J. F. Gmelin was professor of pharmacy and chemistry.¹¹ Seybert's merits were recognized by his election to the Royal Society of Göttingen.

After three years abroad, Dr. Seybert returned to Philadelphia in 1796; sailing from Bordeaux he arrived home in August. On ship-board he collected air for analysis and this was the basis of a paper he wrote on "Eudiometric experiments and observations on sea and land, at different seasons." Dr. Wistar read this report¹² to the American Philosophical Society in November 1796 and two months later Adam Seybert was elected a member. His later paper on "the Atmosphere of Marshes," read Dec. 21 1798, also was printed in the Society's "Transactions."¹²

9. E. F. Smith says "Woodhouse was chosen, though Seybert was, at the time, the more experienced chemist."

10. Dr. Wm. Lowder was a well-known lecturer on midwifery in St. Saviour's churchyard, Southwark. The College of Physicians of Philadelphia has Seybert's manuscript notes of these lectures.

11. F. S. Stromeyer, who succeeded Gmelin, was also studying at Göttingen at this time.

12. It was published in Vol. IV of the "Transactions and Proceedings of the American Philosophical Society," 1799, Philadelphia, as "Experiments and

Although Dr. Seybert attempted to develop a medical practice in the first years after his return from Europe he was not successful. As quoted by Charles Caldwell¹³ the reasons seem obscure: "I [Seybert] made the first year a thousand dollars, which my friends told me, opened to me an encouraging prospect. And I did not myself consider it a very discouraging one. But the second year, though I was equally regular in being at home and in my office, equally attentive to all the professional calls made on me, and all cases placed under my care, and equally successful in the treatment of them, I made but five hundred dollars. And, considering it sound logic to infer that the third year, I should make nothing at all, I abandoned my profession, or rather gave it a kick for its having abandoned me, and have never since felt a pulse or uncased a lancet."

Some explanation may be found in the fact that a year after his return (1797) yellow fever broke out again and it was estimated that 20,000 or a third of the populace fled Philadelphia. Dr. Seybert's office was initially at 191 North Second Street, a short distance beyond his mother's shop. But by 1801 he had abandoned medicine for pharmacy and chemistry, being listed in the city directory for this year as "druggist, chymist and apothecary" at 168 North Second Street, the property he inherited at his mother's death in 1799. He remained here for about a year.

The apothecary shop closest to Dr. Caspar Wistar's office at S. W. corner of Fourth and High Streets while Adam Seybert was studying medicine with him was that of Robert Bass. This shop was at 114 High Street only a few steps east, just beyond the famous Indian Queen Tavern on the S. E. corner. Seybert probably was well acquainted with Mr. Bass from his student days and though Bass was said to be cynical, selfish and often rude to his customers, Dr. B. Rush said he was neat and correct in putting up his medicines and he had accumulated a "genteel estate" from his business. When the elderly Mr. Bass died in 1801, Adam Seybert secured this site and operated his pharmacy there until 1811.

To return to the late 18th century again, we find that Philadelphia was the center of American activity in the field of chemistry. Here was organized, in 1792, the early Chemical Society, of which

Observations on Land and Sea Air." His paper, "Experiments and Observations on the Atmosphere of Marshes," was also printed in this volume (p. 262 and p. 415, respectively).

13. Charles Caldwell's "Autobiography," 1855, edited by H. A. Warner.

Adam Seybert was probably a founding member. James Woodhouse, who graduated in medicine in 1792, is generally credited as the founder and he certainly was a moving force in this Society until his death in 1809. However, James Cutbush, one of the members, refers¹⁴ to "the Chemical Society, under the patronage of Doctors Seybert and Woodhouse," from which we infer that Adam Seybert was at least equally active in the organization. At first the meetings of the Chemical Society were held in the Anatomical Hall of the University on South Fifth Street near Chestnut, opposite the State House Yard. Benjamin Silliman's diary (1802-1803) tells of his attendance on Woodhouse's course in this small frame building: "Above, over the laboratory, was the Anatomical Hall . . . accommodations in both were limited . . . deficiency of extra room for the work which was limited to a few closets . . . apparatus humble." Adam Seybert was off to Europe from 1793 to 1796 but resumed his affiliation with this Chemical Society upon his return; in 1797 he was recording secretary and remained a secretary until at least 1804.

He seems not to have engaged in the phlogiston controversy which was going on in American journals and societies. When he returned from Europe, he found Priestley and Adet violently opposing one another on this subject, and Drs. Mitchell, Woodhouse and Maclean trying to reconcile the opposing views.

A pet project of Dr. Seybert's was forwarding an interest in and knowledge of our country's mineral resources. The Chemical Society advertised in 1797 that its committee¹⁵ would make a free analysis of any minerals sent from any of the states. It was Seybert who conducted the Society's laboratory in the Medical School Building, in one of the "closets" mentioned by Silliman. How many samples he analyzed we do not know; about one of them, however, we do know something. On June 1, 1798 Seybert read a paper to the American Philosophical Society on "Analysis of the minerals composing a supposed ancient wall in North Carolina, with observations on the same." It seems that Woodhouse likewise determined that the "wall" was not an ancient archeological remain, so the A. P. S. committee recommended a joint memoir on the subject. These two young men frequently served together on committees and often collaborated in mutual efforts to advance their science. Both were

14. In his "Philosophy of Experimental Chemistry," Philadelphia, 1813.

15. Consisting of James Woodhouse, Samuel Cooper, John C. Otto and Thomas Smith, in addition to Adam Seybert.

capable, practical chemists, outstanding not only in Philadelphia but in the young republic of the United States. Woodhouse tells ¹⁶ of experiments he performed in the presence of Dr. Seybert and others; and Robert Hare related to the American Philosophical Society (1803) how he "dissipated globules of platinum" with his blowpipe, in the presence of Woodhouse and Seybert.

The young physician was not burdened with much practice and therefore had considerable time to devote to scientific and philosophical pursuits. We find him entering wholeheartedly into the activities of the Chemical and Philosophical Societies. In the latter organization, of which Thomas Jefferson remained president until 1815, Drs. Caspar Wistar and Benjamin Rush were vice-presidents, and Drs. Seybert and Woodhouse secretaries, elected in January 1799. Adam Seybert remained in this post until 1809; he served as a counselor to the Society in 1810 and 1811. Through the years he served on numerous committees of the American Philosophical Society.

His affiliation with the College of Physicians of Philadelphia dates from 1797 when he was elected a fellow and he retained this connection until 1818 when he resigned.

In 1798 Adam Seybert married Maria Sarah Pepper, daughter of Henry Pepper, a wealthy Philadelphia merchant.¹⁷ Two children were born to Adam Seybert and his wife; their daughter Catherine died in infancy, their son Henry, who became a noted mineralogist, was born in 1801. Mrs. Seybert died within the next year and the care of the boy and the subsequent direction of his education were undertaken by Adam Seybert with more than usual devotion.

The first manufacture of mercurials in the United States, in 1801, has been credited to Adam Seybert. This date coincides with his abandonment of medicine for pharmacy and chemistry and we are told ¹⁸ that his laboratory for manufacturing was in the neighborhood of the Globe Mill in Kensington. Also, he is said to have been the first to perfect camphor refining in the United States and to have made a fortune from it in a few years.¹⁹

16. Medical Repository IV (1801):25-34 in "Answer to Priestley's Arguments against the Antiphlogistic System of Chemistry."

17. George Pepper, Seybert's brother-in-law, became one of Philadelphia's richest men. He was the father of George S. Pepper (1808-1890) and William Pepper (1810-1864) noted respectively as philanthropist and physician-teacher.

18. Scharf and Westcott, "History of Philadelphia," 1884, Philadelphia.

19. Charles Caldwell's "Autobiography," 1855, edited by H. A. Warner.

Interesting aspects of this latter subject are as follows. In 1795 camphor refining in the United States according to Woodhouse²⁰ was confined to two druggists and by 1804 there were only eight persons, among them Adam Seybert, who accurately understood the process, and all of them kept it a profound secret. Dr. Woodhouse, however, described the process in detail and even published illustrations of the equipment needed and current prices for it in Philadelphia. He suggested mixing one ounce of slaked or quick lime with every three or four pounds of crude camphor before subliming it.

This information was included by Woodhouse in the fourth American edition of Chaptal's "Elements of Chemistry" which he translated and enlarged; the work was published in Philadelphia in 1807.

Local interest in camphor by the physicians and chemists of Philadelphia is reflected in Dr. B. S. Barton's conclusion²¹ that it was a more wholesome stimulant than nitre for growing plants, and in the thesis of Dr. John Church²² who tried its effects on the growth of plants as well as on the human body. Church says, "The method made use of by the Dutch for purifying this substance was for a long time kept secret. But the process for purifying is now well known. It is, to sublime it again in large glass vessels, combined with an ounce of quick lime for every pound of this substance." Dr. Charles Caldwell also made similar experiments on the effect of camphor, in the late summer of 1796.

In addition to his drug store and chemical manufacturing, Seybert maintained his reputation as "perhaps the earliest American expert in mineral analysis."²³ The collection of minerals gathered by Thomas P. Smith was bequeathed to the American Philosophical Society and Adam Seybert served on the committee selected (1804) to arrange this collection. Woodhouse, Coxe, Barton, and Hare were

20. James Woodhouse writing (1804) to J. R. Coxe for publication in the "Philadelphia Medical Museum," 1 (1805): 197-200, "Observations of the Mode of Refining Camphor."

21. "Hints relative to the stimulant Effects of Camphor upon Vegetables" read to American Phil. Soc. (Sept. 16, 1796) and published (1799) in the fourth volume of its Transactions, p. 232.

22. "An Inaugural Dissertation on Camphor," 1797, Philadelphia; reviewed in Medical Repository 1 (1798): 356-358.

23. Gerard Troost, a Hollander who came to Philadelphia in 1810, was likewise trained in mineralogy by Haüy at Paris (1807). He subsequently (1821) became the first professor of chemistry in the Philadelphia College of Pharmacy.

also members of the committee but apparently the task of arranging and cataloging was left to Seybert²⁴

During Benjamin Silliman's period of study in Philadelphia (1802-1804) he had become acquainted with Dr. Seybert and recognized Seybert's ability as a scientifically trained mineralogist. In 1805 Silliman sent Seybert a small box which contained the few mineralogical and geological specimens belonging to Yale College with the request that he identify and catalog them. The ludicrously inadequate facilities for scientific research in America in those days is exemplified by this incident.

In his "Catalogue of some American minerals found in different parts of the United States,"²⁵ Seybert described forty different minerals. He told of "... radiated zeolite (mesotype) found ... near ... Philadelphia," "marble found in York County," "sulfuret of zinc near Perkiomen Creek" and many others. Each mineral was described in much detail, exhibiting his outstanding learning and pioneering in this field.

Seybert and Woodhouse became involved in a public controversy over the pitchblende found along the Perkiomen Creek in southeastern Pennsylvania. In 1807 Woodhouse sent to the Medical Museum, edited by Dr. Coxe, an account of the zinc mine at Perkiomen and gave an analysis of the ore, sphalerite. He stated that the blende found there could not be worked for its metal.²⁶ Seybert felt differently and maintained²⁷ that the ore would yield the metal. He berated Woodhouse for failing to investigate the matter fully, stating "when the political situation of the country is such that its foreign relations are interrupted, and much is expected from an energetic application of its internal resources, it is the duty of every citizen to contribute his mite towards the end. When erroneous opinions are propagated and unfounded doubts are excited, it is a two-fold duty to place facts in a true point of view." Seybert's outburst was quite contrary to his exalted conduct in general and was unworthy of him. Woodhouse's very bitter reply stated that Dr. Seybert had written a highly personal and improper rebuttal and that it actually had little bearing on the subject in question.

The antagonism generated by this incident perhaps was responsible for Seybert's resignation (Nov. 1808) from the mineralogy com-

24. He resigned from the "committee" in November, 1808.

25. "Philadelphia Medical Museum," 5 (1808):152, 256.

26. "Philadelphia Medical Museum," 5 (1808):133.

27. "Philadelphia Medical Museum," 5 (1808):209.

mittee of the American Philosophical Society of which Woodhouse was also a member.

In 1812, very soon after the Academy of Natural Sciences of Philadelphia was formed, the druggist John Speakman purchased, for \$750, a collection of European minerals which Adam Seybert had gathered. This acquisition was used by the first president of the Academy, Gerard Troost, in a lecture course on mineralogy delivered before the Academy in the latter part of 1812. This group of scientists was not joined by Adam Seybert, although Robert Hare and Thomas P. Jones, from the old Chemical Society, were early members; and Dr. Seybert's son, Henry, became a member in 1826.

Advancing the young industries of America, particularly the development of adequate domestic chemical works, was a major interest of Adam Seybert's throughout his life. Many other persons were likewise concerned with this objective. The embargo of 1806 and the War of 1812 were strong incentives to this end.

At a "meeting of the manufacturers and mechanics of the city of Philadelphia, May 19, 1809," Dr. Seybert delivered an oration, subsequently published as a pamphlet²⁸ in which he pointed out that "Our chemists have succeeded in refining salt petre, alum, and camphor . . . our laboratories will render the importation of red and white lead hereafter unnecessary. They furnish us with oil of vitriol and the other acids . . . Attempts have succeeded in making verdigrease. Culinary salt is obtained from salt springs . . . making of marine salt on the sea-board." He urged "the propriety and necessity of extensively encreasing these establishments."

When Dr. Woodhouse, the professor of chemistry in the medical department of the University of Pennsylvania, became too sick to carry on his course Adam Seybert cooperated (1809) in delivering the lectures. After Woodhouse's death in 1809, Dr. Wistar again exerted himself to have Seybert elected to the chair. However, Dr. Rush's protege John R. Coxe and Robert Hare were the leading contenders and Adam Seybert was once again defeated by Dr. Rush's supporters. Subsequently Hare replaced Coxe in this position (1818) but Seybert by then was far from interested.

The unsuccessful effort to secure the professorship of chemistry may have contributed to Adam Seybert's entry into the political arena.

28. Adam Seybert, "An Oration Delivered . . . at . . . Meeting of the Manufacturers and Mechanics. . .", Philadelphia, N. D. [1809].

His career in Congress is worthy of more than casual mention. He was elected as a Democrat to fill the vacancy in the eleventh Congress left by Dr. Benjamin Say's resignation; he was re-elected to the twelfth and thirteenth and again to the fifteenth Congresses serving from 1811 to 1815 and from 1817 to 1819. His background, wide interests and constant study enabled him to serve his city and country in a commendable way during a critical and emotional period. He advocated a strong navy to maintain American rights on the seas and habitually supported the positions he took on national affairs with data which he carefully gathered from his wide searching.

Material which Dr. Seybert collected while in Congress served for an elaborate volume published as "Statistical Annals of the United States from 1789 to 1818." This large book embraced data on the lands, commerce, population, navigation, post offices, revenues and expenditures, mints, fisheries, exports and imports, army, navy, etc. of the United States. It was published, in 1818, by order of Congress and for many years was the leading reference on our country's statistics and industries.²⁹

In the January 1820 issue of the *Edinburgh Review* the "Statistical Annals" was commented upon by the celebrated Rev. Sydney Smith who asked that often quoted critical question, "Who reads an American book?" Smith stated that the United States had done "Absolutely nothing for the Sciences, for the Arts, for Literature, or even for the statesman-like studies of Politics or Political Economy." He seriously criticized the United States for failing to honor their descent from Great Britain.

This ignorant though scintillating critique prompted James Russell Lowell's equally sharp reply:

"Surely never was a young nation setting forth jauntily to seek his fortune so dumbfounded as Brother Jonathan when John Bull cried gruffly from the roadside, 'Stand and deliver a national literature.' After fumbling in his pockets he was obliged to confess that he hadn't one about him at the moment, but vowed that he had left a first-rate one at home which he would have fetched away—only it was so everlastingly heavy."³⁰

29. French translation was issued in Paris, 1820; Italian edition in Milan, 1820.

30. Discussed by James Eckman, "Anglo-American Hostility in American Medical Literature of the Nineteenth Century," *Bull. Hist. Medicine* 9 (1941):31-71.

After his last term in Congress, Adam Seybert, now aged forty-six, dropped from the public eye. He travelled in Europe from 1819 to 1821, guiding his son's education and enjoying the fruits of his labors free from any financial worries. He loved France particularly and the friends he made there were dear to him. He was a man with many friends in all walks of life. His innate kindness to the unfortunate is reflected in his will where he left \$1000 for the education of the deaf and dumb, smaller sums to the Philadelphia Dispensary and the Orphan asylum. A bequest of \$500 to the Philadelphia Penitentiary was to give discharged prisoners enough money to buy food and shelter for two days and nights.

A notable characteristic of Adam Seybert was his keen desire to prove any doubtful problem by experiment. Seldom was he willing to accept another person's hypothesis until he had tested and proven it by experiment.

During his brief practice of medicine he tried to identify mercury in the body fluids of patients using mercurial medicines. He immersed gold, copper and activated charcoal in the saliva and serum of such patients and concluded "that mercury is combined with blood in such a peculiar way that the above means have not been adapted to detect it."³¹

From many experiments with gases, air especially, Seybert tried to determine differences in purity; collecting samples from various areas over marshes, country and city lands, and the sea, he concluded that the air over large bodies of water was purer than samples over land, which latter varied very little. His experiments actually proved very little, but they do bring out the spirit of his honest endeavors to investigate and prove experimentally. And he was one of our pioneers in air analysis as well as in mineralogy.

The scientific interests of Adam Seybert in the latter years of his life seem to have revolved around the American Philosophical Society and its activities. He donated his extensive collection of statistical works, documents and books to the Society in 1822 and served on a couple of committees during the next few years.

In 1824 he travelled to France again, this time seeking improvement of his health which had not been good for some time before. The best of physicians and care were unable to arrest his malady and he died in the French capital on May 2, 1825, just two weeks

31. E. F. Smith—"Chemistry in Old Philadelphia," 1919, Philadelphia.

before his fifty-second birthday. Burial was in Père La Chaise cemetery, Paris.

The Philadelphia newspaper "The National Gazette" carried an editorial notice of Dr. Seybert's death in the issue for July 8, 1825: "He was a man of great sagacity and industry and considerable attainments in science. He acquired early much distinction as a chemist and mineralogist . . . The good sense, knowledge and assiduity with which he discharged his duties as a legislator, and the just propriety and urbanity of his behavior caused him to be highly esteemed at Washington . . . a moral and upright citizen . . . a very understanding and pleasant companion."

In the hundred and thirty years since his death few persons have attempted to evaluate Adam Seybert as a man or scientist. Those who have, agree that he was a skillful chemist and mineralogist "worthy to rank with Silliman, Hare, Woodhouse, Mitchill," that he was a true scientist who "brought patience and persistence to his work," and that he certainly was "a friend of humanity."

Let us ever cherish the memory of this man, Adam Seybert, for the sake of his guiding hand in the days when chemical science was just a child.

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THE SQUALENE CONTENTS OF VARIOUS OILS

By Wallace Dickhart

HAVING been informed by several physicians that they had prescribed olive oil for relieving pain associated with gall bladder disease, the writer was curious to know if there were any similarities in the constituents of gall stones and olive oil.

Through the kindness of Dr. Kiss of Woodhaven, New York, a number of gall stones were obtained, ranging from 0.10 gram to one large stone of 8.5 grams. The next step was to ascertain if they contained any squalene, an aliphatic hydrocarbon ($C_{30}H_{50}$) found in the unsaponifiable matter of olive oil. Squalene was reported present in 1935 by Drumond and Thorljarson. It was originally isolated from the livers of the Squaloid Sharks in 1916 by Mitsumaru Tsujimoto, prominent Japanese chemist who named it Squalene. It has also been reported to be a normal component of human serum.

Applying the A. O. A. C.¹ method for squalene in oils to the gall stones, the following information was obtained. Five grams of the stones were saponified (they saponified very satisfactorily) forming a dark green soap. The soap was extracted according to the A. O. A. C. with petroleum ether (30-60). After obtaining the extractions it was found that while washing the petroleum ether with water a white crystalline precipitate formed. This was removed to a beaker and dried, after which it was examined and found to have a melting point (closed tube) of $145^{\circ}C$. and an Iodine Value (Wijs) of 129.2. The remaining petroleum ether, freed from these crystals was very carefully washed with a weak solution of KOH, so as not to make an emulsion. After removing the KOH solution the petroleum ether solution was again washed with water until free from alkali. It was transferred to a flask, distilled off and the residue dried in a current of CO_2 (following the method of A. O. A. C.). To the contents in the flask was added cold petroleum ether. At this point the unsaponifiable matter should be soluble, but in this case it was only partly soluble. The soluble portion was filtered through the alumina adsorption tube into an iodine bottle and the squalene content obtained. The undissolved crystals in the flask and in the ad-

1. J. A. O. A. C. 26, 499 (1943).

sorption tube were treated with ethyl ether and filtered into a beaker. The ether was then removed by spontaneous evaporation in a current of air. A beautiful long needle-shaped crystalline product was produced having the same melting point (145° C.) as the water extracted substance; but the iodine value was slightly lower (126.8). These extractions were probably a form of cholesterol, as they gave the characteristic Liebermann-Burchard reaction but the melting points were lower.

The remaining green soap solution from which the unsaponifiable matter had been extracted, was treated with concentrated HCL and extracted with petroleum ether. A waxy substance was extracted having a melting point (closed tube) of 106° C. and an iodine value of 120.4 (Wijs). The sample contained 9.26% of this light yellow colored waxy material. It gave a deep purple color with the Liebermann-Burchard reaction.

The gall stones examined contained considerable squalene, in contrast with fats and oils, except olive oil. The gall stones turned out to be similar to Syrian olive oil in squalene content. For example, one Syrian olive oil gave 725.7 mgs. per 100 grams of sample while the gall stones examined produced 726.7 mgs. per 100 grams of sample. There may be some significance in this relationship in that olive oil has been used therapeutically in this direction.

The following is a list of the approximate squalene content of various oils and fats examined by the A. O. A. C. method:

MGS. OF SQUALENE PER 100 GRAMS OF SAMPLE

Olive oil	150-726
Gall stones (one sample)	726.7
Refined Rice oil	366.0
Patawa oil	162.8
Red oil	128.0
Tall oil	96.0
Japanese Hydrogenated fish oil	63.0
Castor oil	38.0
Palm Kernel	37.1
Chinawood	29.2
Corn oil	28.0
Peanut oil	28.0
Rapeseed oil	28.0

Grapeseed oil	21.0
Butter	17.0
Palm oil	14.6
Cocanut oil	13.4
Sunflowerseed oil	13.0
Poppyseed oil	13.0
Mustard seed oil	13.0
Teaseed oil	12.0
Oleomargine	10.7
Linseed oil	9.7
Cottonseed oil	8.0
Hog Grease	4.5
Dried animal blood	2.1

DIFFERENTIATION OF TETRACYCLINE, OXYTETRACYCLINE AND CHLORTETRACYCLINE

By O. N. Yalcindag (*)

IN a previous article (1) the differentiation of Chlortetracycline and oxytetracycline by the capillary dynamolysis method was reported. Since this some work on the differentiation of these antibiotics chemically was reported (2) the mother substance of the two antibiotics, Tetracycline came into use. In the present paper is reported the differentiation of this new antibiotic from the two others by the capillary dynamolysis and as well as chemical reactions to differentiating these three antibiotics.

Experimental

The capillary dynamolysis method was applied to tetracycline hydrochloride under the same conditions used for oxytetracycline and chlortetracycline using 1 per cent solutions. The results are shown in Figs. 1 and 2.

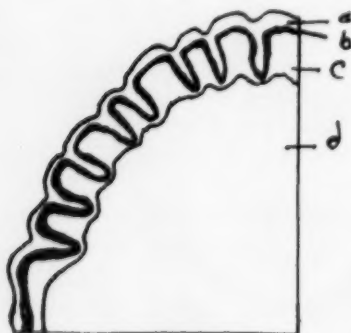


Fig. 1

Capillarogram of Tetracycline
HCl with FeCl_3

- a) Brown b) dark brown
- c) pale dark brown
- d) pale brown

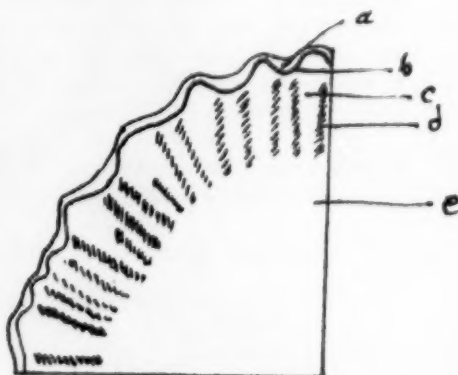


Fig. 2

Capillarogram of Tetracycline HCl with AgNO_3

- a) Pale yellow b) grey
- c) Pale yellow
- d) grey
- e) grey

* Assistant of Galenic Pharmacy at the Istanbul University. The author wishes to thank the firm Orta Sark Ticaret T.A.S. Istanbul for the Terramycin sample supplied, and Lederle Laboratories for the Tetracycline hydrochloride.

The color and precipitation reactions with various reagents are summarized in the following table:

Reagent	Aureomycin HCl	Terramycin HCl	Tetracycline HCl
	1% aq. sol.	1% aq. sol.	1% aq. sol.
Dragendorff	Orange ppn.	Orange ppn.	Dark orange ppn.
Mayer	Amorph. ppn.	Amorph. ppn.	Amorph. ppn.
Picric acid	Amorph. Yellow ppn.	Amorph. Yellow ppn.	Amorph. Yellow ppn.
Bouchardat	Dark brown ppn.	Dark brown ppn.	Dark brown ppn.
0.1% aq. sol. Fe Cl_3	Light brown color.	Dark brown-violet color.	Dark brown-red-violet color.
1 drop Formol sol. + 2 cc. conc. H_2SO_4	Dark brown olive green ring and after shaking same coloration.	Dark brown ring and after shaking same color- ation.	Dark green ring and after shaking dark orange color.
Conc. H_2SO_4	Brown ring and after shaking dark brown color.	Red brown ring and dark red color.	Dark violet ring and after shaking orange- yellow coloration.
Scheibler	Colloidal ppn.	Colloidal ppn.	Colloidal ppn.

Summary

1. Capillarograms of tetracycline hydrochloride with AgNO_3 and FeCl_3 are different from those of Aureomycin and Terramycin. Thus, one can differentiate these 3 antibiotics by this method.

2. They may also be differentiated by reagents such as FeCl_3 , formalin + conc. H_2SO_4 , and Conc. H_2SO_4 .

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BOOK REVIEWS

Biochemical Preparations. Vol. 4. Edited by W. W. Westfeld. John Wiley & Sons, New York, 1955. 108 pp. Price \$3.75.

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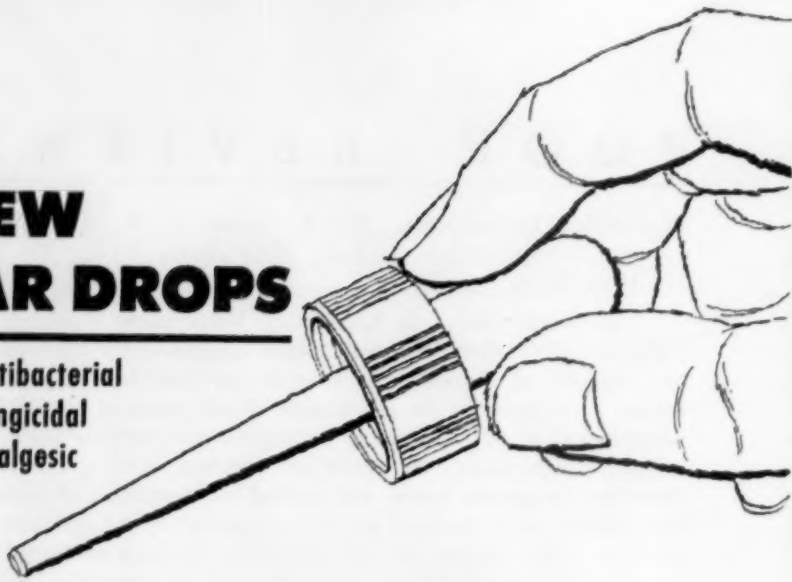
In the third installment, the discussion of the water-soluble vitamins is continued. The first and second installments of part I dealt with Vitamins B₁, B₂, and B₁₂. This installment continues with the discussion on Vitamin B₁₂. Furthermore, p-aminobenzoic acid, folic acid, and pteroyl-glutaminic acid are considered. A complete bibliography and an index covering all subject matter in the three installments contributes greatly to the convenience of the reader.

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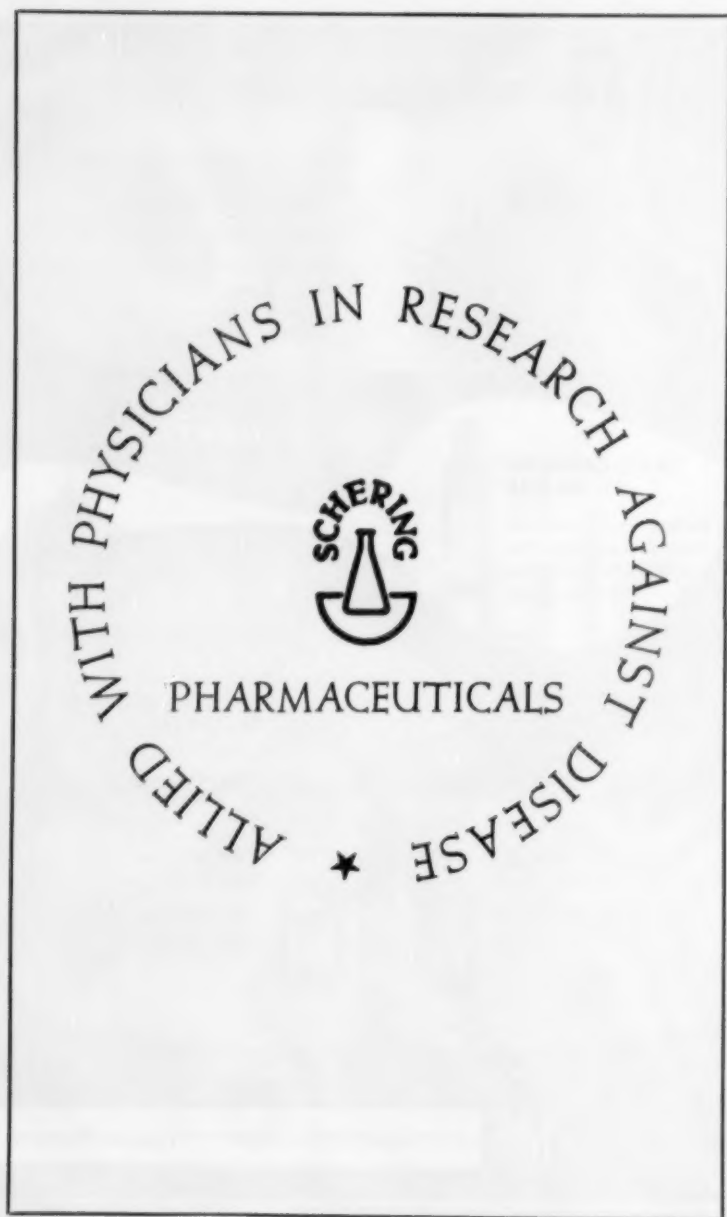
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